Chapter 9 Natural Resources

Introduction

A comprehensive plan focuses many of its policies on the use of land; therefore, it is important to understand the qualities of that land and its natural resources. The geology, topography, soils, vegetation, wildlife, air, and water resources provide a framework for wise land use decisions that avoid environmental hazard areas and preserve valued natural resources.

Background

Geology

The City of Harrisonburg is located within the valley portion of the Ridge and Valley geologic province. The valley is underlain by sedimentary rocks of limestone, dolomite, and shale. A significant characteristic of the limestone and dolomitic rock of Harrisonburg, Rockingham County, and the Shenandoah Valley is its tendency to develop caves, solution channels, and sink holes as acid rainwater dissolves the rock over time. The geologic term for such limestone/ dolomite areas is "karst." The prevalence of sinkholes is significant because such areas can be unstable. Subsidence can damage roads and buildings, though catastrophic collapse rarely occurs.

Karst areas are particularly susceptible to groundwater contamination because of the direct connection between the surface and groundwater through sinkholes and along cracks in surface bedrock. Contamination that seeps down through the sinkholes and cracks can reach the honeycomb of channels and caves below, potentially travelling long distances through these conduits. While few houses or businesses in the City are dependent on groundwater for their source of drinking water, many homes in Rockingham County are served by wells. Some measures that localities can take to protect groundwater in karst areas include: prohibition of waste disposal in sinkholes, requirements that stormwater be directed away from sinkholes, and spill containment measures for industrial and other uses handling toxic or potentially polluting materials near sinkholes.

Soils

A review of the *Soil Survey of Rockingham County, Virginia* (USDA Soil Conservation Service, 1982), which covers the City as well, reveals that the City's soils are dominated by clayey soils formed from limestone. The primary issues for construction are depth to bedrock and the tendency of these soils to shrink and swell with varying moisture levels.

Topography

The City is characterized by rolling topography. Slopes from 0 to 15 percent present few limitations for development. Land in the 15 to 25 percent range is appropriate for residential uses; commercial and industrial development with large buildings and parking areas require a great deal of grading to be constructed on these slopes and are generally less appropriate. Slopes 25 percent and over are usually considered unsuitable for development.

Vegetation and Wildlife

Harrisonburg is an urban area built within an agricultural area. It no longer contains large areas of woodland and natural wildlife habitat. Most wetland areas in Harrisonburg are small.

Significant populations of deer are found in several sections of the City, but otherwise most types of wildlife are those found in urban and suburban settings. Harrisonburg is a certified Tree City USA city, a program of The Arbor Day Foundation and US Department of Forestry. Generally, the citizens of Harrisonburg value the City's remaining green spaces and expressed interest in public meetings in these green spaces being preserved and expanded to the extent possible. Increased tree planting is also supported.

Water Resources

Hydrology: Harrisonburg is drained primarily by two streams, Blacks Run and the Sunset Heights Branch of Cooks Creek. About two thirds of the City sits within the Blacks Run watershed. The area of the City, west of Route 42 and South of Route 33, is in the Sunset Heights Branch watershed. Small areas in the northern part of the City drain to the watershed of the North Fork of the Shenandoah River. The Federal Emergency Management Agency (FEMA) provided the City with updated 100-year floodplain maps for Blacks Run and the Sunset Heights Branch in 2008. The City uses these maps to regulate development in the 100-year floodplain and to prohibit encroachment in the floodway.

Water Quality: Water quality has become an important issue due to several mandatory and voluntary water quality protection programs initiated by EPA, the Commonwealth of Virginia, and the Chesapeake Bay states. The first is the TMDL (Total Maximum Daily Load) program, the second is the Shenandoah and Potomac River Basins Tributary Nutrient Reduction and Nutrient Cap Strategies, and the third is the EPA requirement for the City to obtain a Virginia Pollutant Discharge Elimination System (VPDES) permit related to its Municipal Separate Storm Sewer (MS4) and for developers to obtain a VPDES permit for construction activity stormwater discharges. As part of the City's stormwater management program, developments over one acre are required to provide water quality improvement measures. The City regulates this in accordance with the Virginia Stormwater Management Regulations. Significant changes to these regulations are forthcoming.

TMDLs: The Federal Clean Water Act requires states to identify and clean up water bodies not in compliance with Federal and state water quality standards. Virginia has been required to prepare a list of such "impaired waters" and to determine the total maximum daily (pollutant) loads or TMDLs for each impaired water. The TMDL reflects the total pollutant loading a water body can receive and still meet water quality standards with a margin of safety built in. In 1992, EPA promulgated regulations regarding the development of TMDLs.

Meanwhile, Virginia adopted the *Water Quality Monitoring, Information, and Restoration Act* in 1997, which directed the Department of Environmental Quality (DEQ) to develop a list of impaired waters, to develop TMDLs for them, and to develop implementation plans. For Harrisonburg, six TMDL studies have been completed: two for Blacks Run, two for Cooks Creek, and two for Smith Creek. A TMDL study identifies the sources of the pollutants in the watershed and shows how the pollutant loads from each source must be reduced to meet the water quality standard. For each stream, DEQ has determined that violations occur for both fecal coliforms and benthic organisms. Fecal coliforms are a range of bacteria present in fecal wastes from warm-blooded animals. Their presence indicates the presence of bacteria harmful to

humans. Benthic communities are made up of bottom dwelling organisms in streams. The number and types of benthic organisms found in a stream are indicators of pollution levels.

For Blacks Run, Cooks Creek, and Smith Creek fecal coliform studies, the primary sources have been identified as non-point – stormwater run-off pollution as opposed to pollution from a specific point, such as a wastewater treatment plant discharge pipe. Urban non-point sources include leaking sanitary sewer lines, failing septic systems, and pet and wildlife wastes. A TMDL Implementation Plan has been developed by DEQ, the Department of Conservation & Recreation in consultation with local landowners and citizens and the City and County to determine what must be done to meet the fecal coliform TMDL pollution load reduction goals. Virginia has chosen to develop TMDL implementation plans that encourage voluntary actions to meet Federal water quality standards. The City, for example, has implemented a number of measures to reduce fecal waste loads, such as, a sanitary sewer inspection and management program to prevent sewage leaks, and education programs on septic pump-outs and pet waste clean-up.

The benthic TMDL studies identify the sources of pollution that adversely affect benthic organisms. Again, non-point source pollution is the problem, and in the City, sedimentation is the chief culprit. Harrisonburg continues to address these problems by such measures as: improved sedimentation and erosion control regulations and enforcement, stormwater management best management practices (BMPs), a stream bank stabilization program, planting of riparian vegetation, and increased street cleaning. While Virginia's approach has been to seek voluntary measures to reduce pollution loads, if such measures do not result in better water quality in streams, the state may require that measures be implemented to meet Federal water quality standards. EPA has the legal authority to require enforcement of TMDLs.

The City's Forest Management Plan also addresses water quality measures, which are primarily related to improving the quality of water at the City's intake area northwest of Rawley Springs, Virginia, along Dry River and two of its principal tributaries.

Shenandoah and Potomac River Basins, Tributary Nutrient Reduction and Nutrient Cap Strategies: While the TMDL program has as its basis the Clean Water Act and the law enforcement backing of the Federal government, the Shenandoah and Potomac River Basins Tributary Nutrient Reduction and Nutrient Cap Strategies are based on agreements between the Chesapeake Bay watershed states, agreements that are not currently federally enforced.

In 1987, Virginia, Maryland, Pennsylvania and the District of Columbia signed a Chesapeake Bay Agreement that recognized the role of nutrient pollution (nitrogen and phosphorus) in the Chesapeake Bay's water quality problems. In the 1987 agreement, the states set a goal of reducing controllable annual nitrogen and phosphorus loads into the Bay waters by 40 percent by 2000. In 1992, the states agreed that the most effective way to meet the 40 percent reduction goal would be to develop specific nutrient reduction strategies for each major tributary of the Chesapeake Bay river basin. With the cooperation of the City, Rockingham County and other localities in the Southern Shenandoah Region, including Augusta, Highland and Page counties, a tributary strategy was developed and adopted in 1996 for the region's portion of the Shenandoah River watershed. The strategy was projected to achieve a reduction of nitrogen loading by 43

percent and phosphorus loading by 40 percent for the Southern Shenandoah Region. The reduction was to come from both point and non-point sources. The point sources are the wastewater treatment plants, some of which were proposed to be retrofitted with biological nutrient reduction (BNR) technology to reduce nutrient discharges. The most significant reductions were projected to come, however, from agricultural non-point source reductions through the implementation of agricultural Best Management Practices (BMPs). The Harrisonburg Rockingham Regional Sewer Authority has since made BNR improvements to the North River Wastewater Treatment Plant. Meanwhile, Rockingham County and the Central Shenandoah Soil and Water Conservation District have worked with farmers to implement agricultural BMPs.

The 1987 Bay Agreement not only set a goal of reducing nutrient pollution by 40 percent by 2000, but also a goal of capping nutrient loads at that level. In other words, a "cap strategy" would need to be developed to prevent nutrient loads from increasing above the 40 percent level even as growth in the watershed continues. In March 2001, Virginia issued *the Draft Interim Nutrient Cap Strategy for the Shenandoah and Potomac River Basins*. The Nutrient Cap Strategy is called interim because water quality goals for the Chesapeake Bay are slated to change. The final cap strategy will have to address these new goals, which are not yet finalized. Under the interim cap strategy, the City may be asked to implement stormwater management BMPs not only for new development but also to retrofit existing developed areas.

MS4 Phase II Stormwater Management Program: In 1999, EPA published a new rule extending stormwater quality controls to small cities. Large cities had already been required to obtain National Pollution Discharge Elimination System (NPDES) permits for their stormwater systems, but now small cities would be required to as well. Applications for the 5-year NPDES permit were due March 2003. As required by the rule, Harrisonburg's permit application included a description of its proposed stormwater management program to include six minimum control measures:

- Public education and outreach on stormwater impacts
- Public involvement/participation
- Illicit discharge detection and elimination (i.e. elimination of point discharges of pollution into the stormwater management system)
- Construction site stormwater runoff control (i.e. improved erosion and sediment control)
- Post-construction stormwater management in new development and redevelopment (urban stormwater management BMPs to control water quality as well as quantity)
- Pollution prevention/good housekeeping for municipal operations

The first 5-years of the permit ended June 30, 2008 and Harrisonburg submitted a new application and program plan, which became effective on July 1, 2009.

Air Quality

The City of Harrisonburg and Rockingham County are currently considered to be "in attainment" of the National Ambient Air Quality Standards (i.e., no violations of the air quality standards have been observed). Recent regulations issued by EPA have revised the standard for ozone, making it more stringent. A number of communities across Virginia have been recommended by

the Virginia Department of Environmental Quality for ozone "nonattainment" designation based on monitored data, including Shenandoah Valley communities of Frederick County and Winchester, the Roanoke area, and portions of Page and Madison counties in Shenandoah National Park. There is one ozone monitor in Rockingham County.

Noise

A primary source of noise in the City is Interstate 81. The level of traffic and the high percentage of trucks make this a significant source of noise for properties near the road. Noise levels exceed Federal Highway Administration (FHWA) noise standards at varying distances depending on the presence of screening topography. To address noise, the City should consider avoiding planning residential and other noise sensitive uses adjacent to the interstate or recommend standards for such uses that ensure that both indoor and outdoor ambient noise levels do not exceed FHWA standards.

Light Pollution

Light pollution has become an increasing concern in a number of localities and has been mentioned by Harrisonburg citizens. As more and more individuals and businesses install security lighting or increase the intensity of existing lights, the problems of poorly designed lighting systems increase. The Comprehensive Plan includes a recommendation to reduce light pollution, while recognizing the importance of quality lighting for crime prevention. State code changes will be needed to implement standards to prevent excessive lighting.

Natural Resources Goal, Objectives and Strategies

Goal 8. To preserve and enhance the City's natural resources and encourage development that is compatible with nature.

Objective 8.1 To keep abreast of environmental issues facing the City and to monitor the City's environmental health.

Strategy 8.1.1 To tap local expertise as available to keep abreast of environmental issues facing the City and to monitor the City's environmental health.

Strategy 8.1.2 To prepare an annual or biannual "state of the City's environment" report using compiled data collected by the City, the Virginia Department of Environmental Quality, the Virginia Department of Conservation and Recreation and other sources and describing and recommending programs to address environmental issues.

Objective 8.2 To develop water and air quality improvement programs to comply with federal and state standards, programs and requirements.

Strategy 8.2.1 To continue to implement the City's MS4 Phase II storm water management program dealing with improving the quality of storm water runoff.

Strategy 8.2.2 To continue working with the Virginia Department of Environmental Quality, the Virginia Department of Conservation and Recreation, and

other partner organizations that implement best management practices to improve stormwater and water quality.

Strategy 8.2.3 To collaborate with Rockingham County and the Virginia Department of Environmental Quality in developing an air quality improvement plan, should the region be declared to be nonattainment for ozone pollution.

Objective 8.3 To create a set of environmental performance standards for public and private development and redevelopment projects.

Strategy 8.3.1 Using state standards where applicable, to prepare a set of environmental performance standards for all development which may include such issues as:

- Pollutant discharges into water resources
- Air emissions
- Erosion and sediment control
- Noise exposure limits
- Excessive light emissions
- Energy use and efficiency
- Protection of environmental features: floodplains, wetlands, steep slopes, sinkholes, tree cover

Sufficient funding will need to be secured to establish this new program.

Strategy 8.3.2 To ensure coordination with state agencies on project compliance with state environmental standards.

Strategy 8.3.3 To consider adoption of local environmental performance standards as either policies or regulations after public input.

Objective 8.4 To preserve and expand green spaces and tree planting in the City.

Strategy 8.4.1 To consider adopting open space preservation requirements or incentives for new development.

Strategy 8.4.2 To purchase and accept donations of land for the implementation of the Blacks Run Greenway and other planned greenway and park projects.

Strategy 8.4.3 To include streetscape improvement plans in downtown, neighborhood conservation area, business revitalization area, and corridor enhancement plans.

Strategy 8.4.4 To implement landscape improvement demonstration projects at City gateways and other appropriate locations.

Strategy 8.4.5 To consider adding street tree planting and other landscape requirements for new development and redevelopment in the City's land use codes.

Strategy 8.4.6 To prepare and implement landscape plans for City public facility development projects.

Strategy 8.4.7 To provide proper maintenance of City trees to ensure tree health and to minimize damage to utility lines.

Strategy 8.4.8 To implement stream riparian buffer and planting projects in partnership with public and private entities when possible.

Objective 8.5 To promote resource conservation.

Strategy 8.5.1 To promote recycling through:

- Continued public education campaigns
- Adoption of regulations requiring businesses to sort their recyclable solid waste and make it available for collection
- Giving City purchasing preference to recycled paper

Strategy 8.5.2 To promote water conservation through:

- Public education campaigns
- Collaboration with local hardware and building supply stores to promote water conserving fixtures and appliances.